CLAIMS OF THE INVENTION

WE CLAIM:

1.   A method for processing a packet to determine packet routing information comprising:

receiving a packet, the packet comprising a header and a payload;

copying at least a portion of the header;

inputting the at least a portion of the header into a look-up device, the look-up device configured to output header data extraction parameters to control the extraction of packet processing control data from the header of the packet;

copying at least a portion of the header to obtain packet processing control data, the portions copied controlled at least in part by the header data extraction parameters; and

inputting the packet processing control data into a content addressable memory, the content addressable memory configured to output packet processing information to control processing of the packet.

2.   The method of Claim 1, wherein the header contains packet protocol information.

3.   The method of Claim 1, wherein header data extraction parameters comprise one or more offset values from the beginning of the packet header.

4.   The method of Claim 1, wherein copying at least a portion of the header further comprises copying at least a portion of a tag.

5.   The method of Claim 1, wherein the look-up device and the content addressable memory are embodied in a single content addressable memory device.

6.   The method of Claim 1, further including masking the header.

7.   A method for identifying a protocol and generating a search key comprising:

extracting a portion of a data item to obtain protocol information;

providing the protocol information to a first look-up device to obtain data item configuration information;

extracting processing information from the data item based on the data item configuration information; and

providing the processing information to a second look-up device to obtain data item handling information.

8.   The method of Claim 7, further including applying a first mask to the protocol information prior to providing the protocol information to the first look-up device to obtain data item configuration information and applying the second mask to the processing information prior to providing the processing information to a look-up device to obtain data item handling information.

9.   The method of Claim 7, wherein a look-up device comprises a content addressable memory.

10.   The method of Claim 7, wherein the data item comprises a packet and the processing information comprises at least a destination address.

11.   The method of Claim 7, wherein extracting protocol information comprises copying at least a portion of the first byte of the data item.

12.   A method for generating a search key for use in packet processing comprising:

        analyzing a packet to obtain a protocol key, the protocol key representative of the packet's protocol, the protocol controlling packet header configuration;

        performing a look-up using the protocol key to obtain one or more offset parameters;

        extracting information from the packet based on the one or more offset parameters to form a search key; and

        performing a look-up based on the search key to obtain information regarding how to process the packet.

13.   The method of Claim 12, wherein the protocol is selected from the group consisting of IPv4, IPv6, and DiffServ.

14.   The method of Claim 12, wherein the offset parameters comprise an plurality of values that represent one or more offsets from the start of the packet.

15.   The method of Claim 12, further including designating the packet to one or more of a plurality of different transmit priority queues based on the information regarding how to process the packet.

16.   The method of Claim 12, wherein at least one performing a look-up occurs using a content addressable memory.

17.   The method of Claim 12, wherein the protocol key comprises at least a portion of the first two bytes of a header of the packet.

18.   A system for extracting header data from a packet, the extracted header data selected for use in processing the packet, the system comprising:

        a first state machine configured to extract protocol data from the packet;

        a first look-up device in communication with the first state machine configured to match the protocol data to obtain offset parameters;

        a second state machine configured to receive the offset parameters and extract search key data from the packet based on the offset parameters;

        a second look-up device in communication with the second state machine configured to match the search key data to obtain packet processing control data.

19.   The system of Claim 18, wherein the first look-up device comprises discrete logic and the second look-up device comprises one or more content addressable memories located on one or more integrated circuits separate from the system for extracting header data.

20.   The system of Claim 18, wherein the first and second state machines comprise a single state machine.

21.   The system of Claim 18, further including a ternary content addressable memory configured to mask either of the protocol data or the offset parameters.

22.   The system of Claim 18, further including memory configured to store the packet and to be accessible by the first state machine and the second state machine.

23.   The system of Claim 18, wherein the offset parameters define locations within the packet of the search key data.

24.   The system of Claim 18, wherein the protocol data defines the type of protocol used to construct the packet.

25.   A system for determining the location of data in a header of a data item comprising:

        a register configured to store a portion of header data of a data item;

control logic connected to the register and configured to selectively input the data stored in the register into a table device;

a table device loaded with various combinations of header data and associated location data, wherein the location data reveals the location of data useful for data item processing within the data item.

26.   The system of Claim 25, further including a memory to store the data item, the register being in communication with the memory.

27.   The system of Claim 25, further including a masking unit configured to mask a portion of the header data.

28.   The system of Claim 25, further including a processing unit connected to the table device and configured to load the table device.

29.   The system of Claim 25, wherein the location data comprises one or more offsets from the start of the data item.

30.   A search key generation apparatus comprising:

means for receiving a data item;

means for providing a portion of the data item containing data item protocol information to one or more look-up devices to obtain data location information; and

means for extracting portions of the data item based on the data location information to generate a search key.

31.   The apparatus of Claim 30, wherein the data item comprises a packet.

32.   The apparatus of Claim 30, wherein means for extracting portions of the data item based on the data location information to generate a search key comprises means for extracting type of service information.

33.   The apparatus of Claim 30, further including means for providing the search key to a content addressable memory to obtain data item processing information.